

Patent claims

1. Distraction apparatus for orthodontic/orthognathic and maxillofacial surgery purposes on the mandible for the distraction of an anterior bone segment comprising,

a first distractor module (1) and a second distractor module (2), wherein the first distractor module (1) is essentially U-shaped and adapted to a dental arch and has a mid-segment (3) and on both sides thereof an end-segment (4), wherein the corresponding end-segment (4) is connected to the mid-segment (3) via a linear distraction element (5) and wherein each end-segment (4) has fixation means, and

where the second distractor module (2) is related to a frontal bone segment to be moved and is fixating the same and has fixation parts (12,13).

2. Distraction appliance according to claim 1, wherein the corresponding end-segments (4) of the first distractor module (1) have fixation elements for an attachment on the lateral teeth.

3. Distraction appliance according to claim 1, wherein the end-segments (4) of the first distractor module (1) provide fixation elements for a screw fixation by means of bone screws on the mandible.

4. Distraction appliance according to claim 1, wherein the corresponding distraction element (5) is constructed from at least three elements (6,7,8) which are connected to each other, where the first element (6) takes the form of a sleeve and pivoting inside the second and third element (7,8) are screwed in with counter rotational threads such that a rotation of the first element (6) in one or the other sense results in a lengthening or shortening of the distraction element (5).

5. Distraction appliance according to claim 4, wherein in the area of the corresponding distraction element (5) a section point (38) is provided in the area of which the end-segment (4) can be resolved from the mid-segment (3).

6. Distraction appliance according to claim 1, wherein the second distractor module (2) takes the shape of a hinge (14) with two hinge-halves (10,11) where one hinge-half

(10) is relating to the chin and the other hinge-half (11) to the frontal bone segment to be distracted.

7. Distraction appliance according to claim 6, wherein the hinge axis (21) is about parallel to the occlusal plane and vertical to the sagittal plane.

8. Distraction appliance according to claim 6, wherein the hinge (14) has a stop position (15) for limiting the rotation range of the hinge-halves (10,11).

9. Distraction appliance according to claim 6, wherein the fixation parts are formed by drill holes.

10. Distraction appliance according to claim 9, wherein the drill hole is formed by a slotted hole (12).

11. Distraction appliance according to claim 10, wherein the slotted hole (12) is formed by partially overlapping drill holes (16) such that discrete fixation positions are provided.

12. Distraction appliance according to claim 10, wherein a guiding sleeve (17) is inserted in the slotted hole (12), which is movable along the slotted hole (12) and where a

fixation screw can be inserted into the guiding sleeve (17).

13. Distraction appliance according to claim 12, wherein the guiding sleeve (17) can be clamped (19,20) inside of the slotted hole (12).

14. Distraction appliance according to claim 12, wherein a cable linkage is attached on the guiding sleeve (17), by means of which linkage the leg (11) bearing this guiding sleeve (17) of the second distractor module (2) can be pivoted around the hinge axis (21).

15. Distraction appliance according to claim 14, wherein the cable linkage can be tautened by means of a screw element (24) held in a bearing.

16. Distraction appliance according to claim 6, wherein the one hinge-half (10) is V-shaped and where on the two free ends of the two legs fixation parts are provided.

17. Distraction appliance according to claim 14, wherein an additional fixation point is provided at the connection point between the two legs.

18. Distraction appliance according to claim 1, wherein the second distractor module (2) is held pivoting on the mid-segment (3) of the first distractor module (1).

19. Distraction appliance according to claim 18, wherein the second distractor module (2) is a cantilever (31; 41), whereas this cantilever (31; 41) is connected to the mid-segment (3) of the first distractor module (1) and whereas the cantilever (31; 41) has fixation parts for the frontal bone segment.

20. Distraction appliance according to claim 19, wherein the second distractor module (2) is an U-shaped cantilever (31) with two legs and a mid-segment (32) connecting the two legs, whereas the mid-segment (32) is connected to the mid-segment (3) of the first distractor module (1) and whereas the free ends of the two legs provide fixation parts.

21. Distraction appliance according to claim 18, wherein the second distractor module (2) is an essentially beam-shaped cantilever (41) which has fixation parts on its free ends.

22. Distraction appliance according to claim 19, wherein the cantilever (41) can be shortened or lengthened by means of an adaptation mechanism (43,44,46).

23. Distraction appliance according to claim 22, wherein the adaptation mechanism (43,44,46) has a spindle drive with shaft joint.